TORISAN

ENGINEERING SPECIFICATIONS

TFT COLOR LCD MODULE

TM220WX-71N31

- 56cm (22.0 inch) diagonal
- XGA-Wide resolution (1280 x 720 pixels)
- Wide View Angle (SVA Technology)
- LVDS Interface (RGB x 8 bits x 1channel)
- Display Color: 16,777,216 colors (8bits)
- With CFL backlight unit and inverter
- Nonglare surface type

(PRELIMINARY)

Ver.2 Nov 8, 2002

Tottori SANYO Electric Co., Ltd.
LCD Division

3-201, Minami-yoshikata, Tottori, 680-8634 Japan
TEL: 81-857-21-2941, 1958
FAX: 81-857-21-2162

Senior Manager N. OMOTE

Section Manager K. REMBUTSU

NOTICES

1. The contents stated in this document and the product may be subject to change without prior notice.
   When you kindly study to use this product, please ask our distributor or us for the latest information.
2. This product is developed and produced for usage onto normal electronic products (office automation equipments, communication peripherals, electric appliance products, game machines, etc.) and is not suitable for applications which need extremely high reliability and extreme safety (aero- or space-use machines, control equipments for nuclear power, life keeping equipments, etc.).
3. This document shall not grant or guarantee any right to adapt intellectual property or any other patents of third party.
4. Please use this product correctly according to operating conditions and precautions for use stated in this document.
   Please install safety proof in your designing to avoid human accident, fire accident and social damage, which may be resulted from malfunction of this product.
5. This product is not designed to withstand against radiant rays.
6. It is strictly prohibited to copy or publish a part or whole of this document without our prior written approval.

REVISION HISTORY

DATE	REVISION NO.	PAGE	DESCRIPTIONS
Jul. 18, 02	Ver. 1	-	Initial Release
Nov. 8, 02	Ver. 2	2	ELECTRICAL ABSOLUTE MAXIMUM RATINGS Power supply voltage(VDDB-VSS) Input voltage(VIB)
		3	ELECTRICAL CHARACTERISTICS of LOGIC Power supply current ELECTRICAL CHARACTERISTICS of INVERTER Power supply voltage Power supply current LAMP LIFE
		4	OPTICAL CHARACTERISTICS Color gamut
		7	INTERFACE PIN CONNECTIONS : BLCN1
		16	OUTER DIMENSIONS Shape of stud Pin number of CN1 and BLCN1

MECHANICAL CHARACTERISTICS

Ta=25ºC

ITEM	SPECIFICATION	UNIT
Module size（LCD only）	525.6(W) x 307.9(H) x 31.0 Max.(t)	mm
Module size（with inverter）	525.6(W) x 307.9(H) x 38.55 Max.(t)	mm
Resolution	1280 x RGB(W) x 720(H)	pixel
Sub pixel pitch	0.127(W) x 0.381(H)	mm
Pixel pitch	0.381(W) x 0.381(H)	mm
Active viewing area	487.68(W) x 274.32(H)	mm
Bezel opening area	491.7(W) x 278.3(H)	mm
Weight	(3,000) Max.	g

ELECTRICAL ABSOLUTE MAXIMUM RATINGS

Ta=25°C

ITEM	SYMBOL	MIN	MAX	UNIT	NOTE
Power supply voltage	V_{DD}-V_{SS}	-0.3	6.0	V	Logic
	V_{DDB}-V_{SS}	0.0	16.0	V	Inverter
Input voltage	V_I	V_{SS} -0.3	V_{DD} +0.5	V	Logic
	V_{IB}	V_{SS} -0.3	V_{SS} +6.0	V	Inverter

ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	CONDITIONS	MIN	MAX	UNIT	NOTE
Ambient temperature	T_{ST}	Storage	-20	60	°C	Note 1
	T_{OP}	Operation	0	50		
Humidity	-	Ta=40°C Max.	-	85	%RH	No condensation Note 2
Vibration	-	Storage	-	1.5	G	Note 3
Shock	-	Storage	-	50	G	XYZ 11ms/direction

[Note 1] Care should be taken so that the LCD module may not be subjected to the temperature beyond this specification.

[Note 2] Ta>40°C: Absolute humidity shall be less than that of 85%RH/40°C.

[Note 3] 10-200Hz, 30min/cycle, X/Y/Z each one cycle and except for resonant frequency.

ELECTRICAL CHARACTERISTICS of LOGIC

fV=60Hz, Ta=25ºC

ITEM	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT	NOTE
Power supply voltage	V_{DD}-V_{SS}		4.5	5.0	5.5	V	
Power supply current	I_{DD}	Note 1	-	(375)	(750)	mA	V_{DD} =5.0V
LVDS input threshold voltage	V_{TH}	High level	-	-	+100	mV	V_{CM} =1.2V
	V_{TL}	Low level	-100	-	-		
LVDS input common mode voltage	V_{CM}		1.0	1.2	1.4	V	V_{DD} =5.0V
LVDS input termination resistor	R_T		-	100	-	Ω	Internal

[Note 1] Display pattern of typical power supply current is 256 gray scale bar.

ELECTRICAL CHARACTERISTICS of INVERTER

Ta=25ºC

ITEM	SYM.	CONDITIONS	MIN	TYP	MAX	UNIT
Power supply voltage	V_{DDB}-VSS	Continuous operation	11.0	13.0	15.0	V
Power supply current	I_{DDB}	V_{DDB} =13.0V, V_{BRT} =0.0V	3.0	3.5	4.0	A Note 2
ON/OFF control	ON/OFF	Lamp ON	2.0	-	5.0	V
		Lamp OFF	0.0	-	0.8	V
Brightness control voltage	V_{BRT}	V_{DDB} =TBD.V, Note 1	0.0	-	5.0	V

[Note 1] V_{BRT} =0.0V : Max Brightness

V_{BRT} =5.0V : Min Brightness

[Note 2] Before starting brightness measurement, you should leave LCD in normal ambient temperature for an hour and turn on B/L for fifteen minutes.

LAMP LIFE

This module has the direct type backlight with 8 cold cathode fluorescent Lamps (CCFL). The life time of single Lamp is shown below.

Ta=25ºC

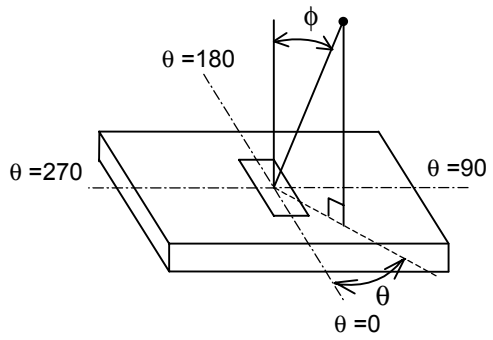
ITEM	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Lamp life	t_{OL}	V_{DDB} =13V, V_{BRT} =0.0V	(50,000)	-	-	hrs

OPTICAL CHARACTERISTICS

V_{DD}=5.0V, fv=60Hz, Ta=25ºC

ITEM		SYMBOL	CONDITIONS		MIN	TYP	MAX	UNIT	NOTE
Brightness		B	ϕ = 0º		-	(450)	-	cd/m^2	Note 4,8
Brightness uniformity		δ_B	ϕ = 0º		-	-	(1.45)	-	Note 6,7,8
Contrast ratio		CR	ϕ = 0º		-	(600)	-	-	Note 2,4,8
Viewing angle range		ϕ	CR>10	θ = 0º	-	(85)	-	deg.	Note 1,2, 4,8
				θ = 90º	-	(85)	-		
				θ =180º	-	(85)	-		
				θ =270º	-	(85)	-		
Response time	Rise	tr	ϕ =0º		-	(14)	-	ms.	Note 3,4,8
	Fall	tf			-	(6)	-		
Color of CIE Coordinate	Red	x	ϕ =0º		-	TBD	-	-	Note 4,8
		y			-	TBD	-		
	Green	x			-	TBD	-		
		y			-	TBD	-		
	Blue	x			-	TBD	-		
		y			-	TBD	-		
	White	x			0.250	0.280	0.310		
		y			0.260	0.290	0.320		
Color gamut		C	ϕ=0º, to NTSC		-	(75)	-	%	Note 4,8

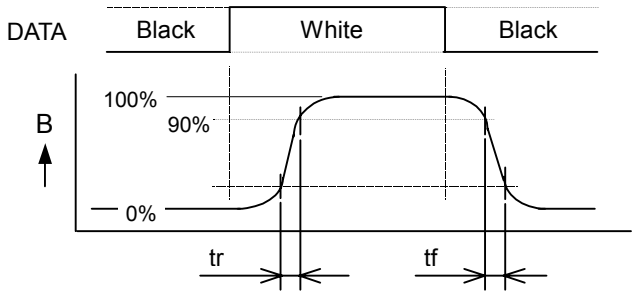
[Note 1] Definition of "ϕ" and "θ"



[Note 2] Definition of contrast ratio "CR" :

$$CR = \frac{\text{Brightness at White}}{\text{Brightness at Black}}$$

[Note 3] Definition of response time "tr" and "tf"



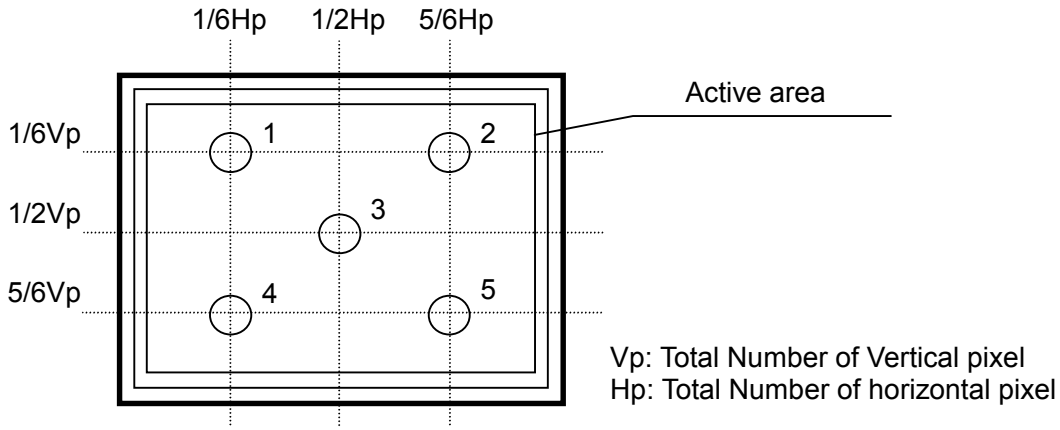
[Note 4] This shall be measured at center (point No.3 shown in Note 7).

[Note 5] The brightness shall be the average of five points shown in Note 7.

[Note 6] Definition of Brightness uniformity "δ_B"

$$\delta_B = \frac{\text{Maximum brightness of five points}}{\text{Minimum brightness of five points}}$$

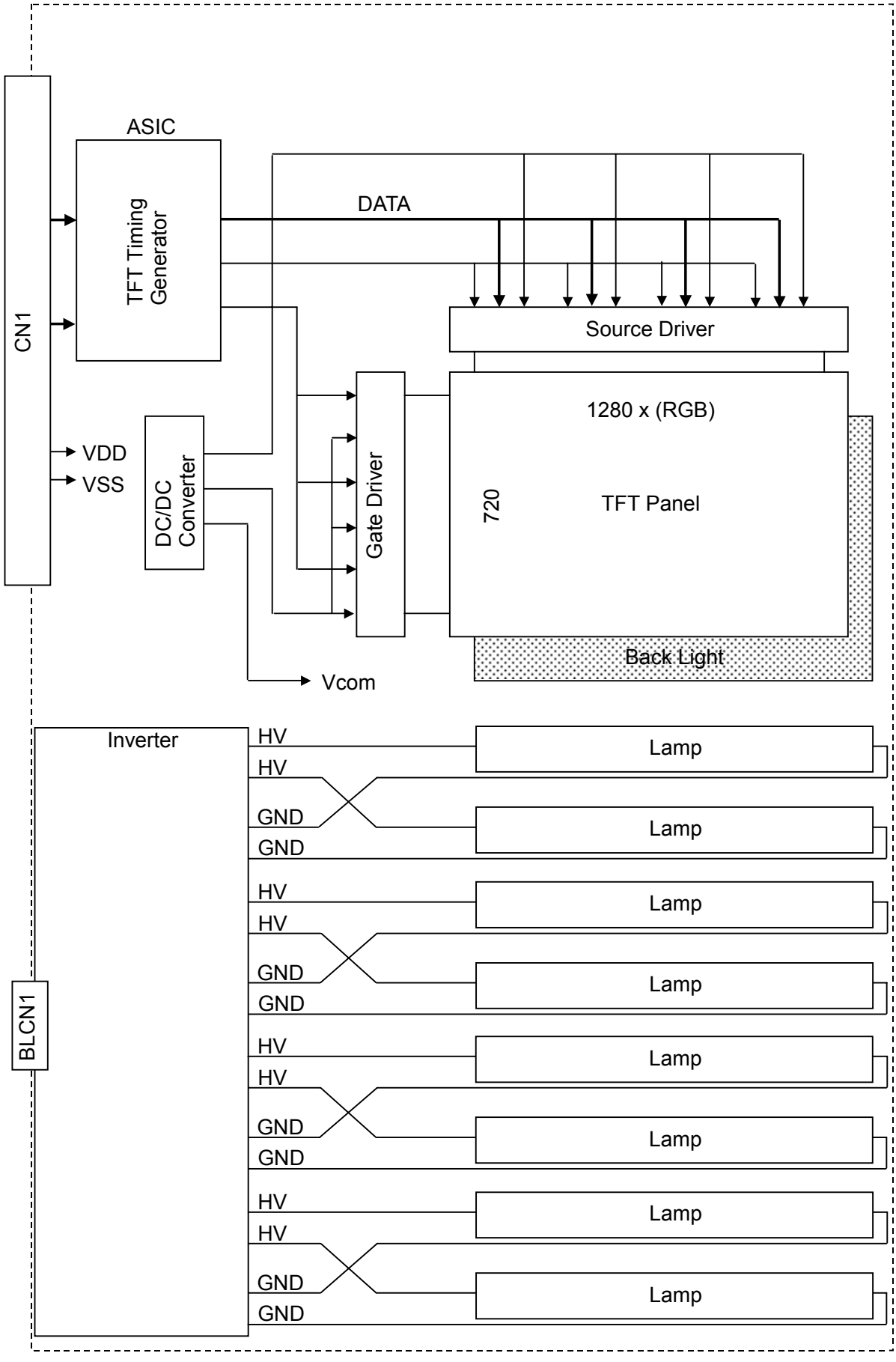
[Note 7] Measurement points



[Note 8] Measurement condition

(1) Measurement equipment: BM-5A (TOPCON Corp.), Field=2º
(2) Ambient temperature Ta: 25±2ºC
(3) LCD: All pixels are White or Black or Red or Green or Blue, V_{DD}=5.0V, fV=60Hz
(4) Measure after 30 minutes of Lamp warm up.
(5) Inverter input: V_{DDB}=13.0V, Maximum Brightness

BLOCK DIAGRAM



INTERFACE PIN CONNECTIONS

LCM : CN1

PIN NO.	SYMBOL	FUNCTION
1	NC	No Connection
2	VSS	Power Ground
3	Rin0-	LVDS Differential Data Input
4	Rin0+	LVDS Differential Data Input
5	VSS	Power Ground
6	Rin1-	LVDS Differential Data Input
7	Rin1+	LVDS Differential Data Input
8	VSS	Power Ground
9	Rin2-	LVDS Differential Data Input
10	Rin2+	LVDS Differential Data Input
11	VSS	Power Ground
12	RCLK-	LVDS Differential Clk Input
13	RCLK+	LVDS Differential Clk Input
14	VSS	Power Ground
15	Rin3-	LVDS Differential Data Input
16	Rin3+	LVDS Differential Data Input
17	VSS	Power Ground
18	VSS	Power Ground
19	VDD	Logic Power Supply (5.0V normal)
20	VDD	Logic Power Supply (5.0V normal)

CN1: DF14A-20P-1.25H (HIROSE)
Suitable mating connector: DF14H-20S-1.25C (HIROSE)

[Note 1] Internal termination resistors of LVDS input lines are 100Ω.

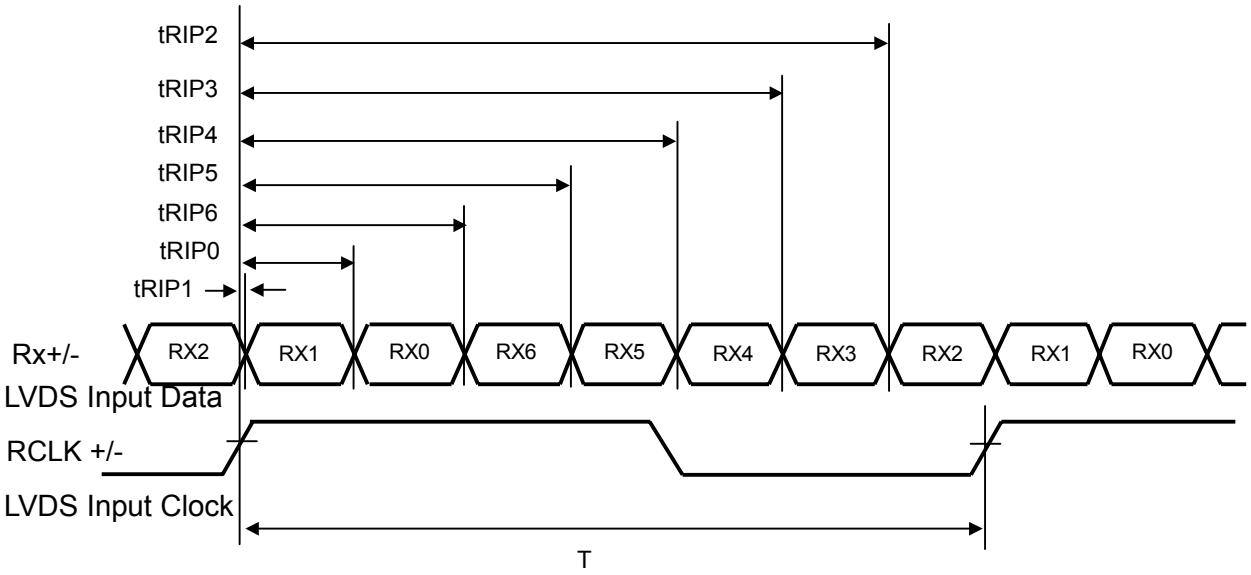
INVERTER : BLCN1

PIN NO.	SYMBOL	FUNCTION
1	VDDB	Power Supply (12 –14V)
2	VDDB	Power Supply (12 –14V)
3	VDDB	Power Supply (12 –14V)
4	VDDB	Power Supply (12 –14V)
5	VDDB	Power Supply (12 –14V)
6	VDDB	Power Supply (12 –14V)
7	VSS	Power Ground
8	VSS	Power Ground
9	NC	No Connection
10	VSS	Power Ground
11	VSS	Power Ground
12	ON/OFF	ON/OFF control
13	VSS	Power Ground
14	VBRT	Brightness control voltage (0.0 –5.0V)
15	VSS	Power Ground

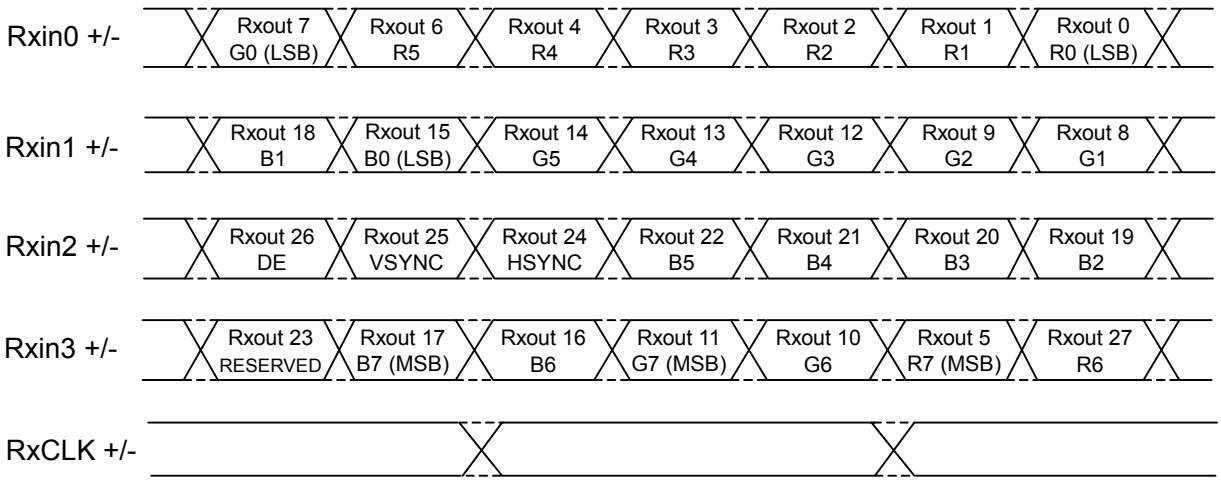
CN1: 53261-1590 (MOLEX)
Suitable mating connector: 51021-1500 (MOLEX)

INTERFACE (LVDS)SIGNAL TIMING PARAMETERS

ITEM	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
InputDataPosition0	tRIP1	T=7.4ns	-0.25	0.0	0.25	ns
InputDataPosition1	tRIP0	T=7.4ns	T/7-0.25	T/7	T/7+0.25	ns
InputDataPosition2	tRIP6	T=7.4ns	2T/7-0.25	2T/7	2T/7+0.25	ns
InputDataPosition3	tRIP5	T=7.4ns	3T/7-0.25	3T/7	3T/7+0.25	ns
InputDataPosition4	tRIP4	T=7.4ns	4T/7-0.25	4T/7	4T/7+0.25	ns
InputDataPosition5	tRIP3	T=7.4ns	5T/7-0.25	5T/7	5T/7+0.25	ns
InputDataPosition6	tRIP2	T=7.4ns	6T/7-0.25	6T/7	6T/7+0.25	ns



INTERFACE SIGNAL TIMING DIAGRAM (DE_MODE)



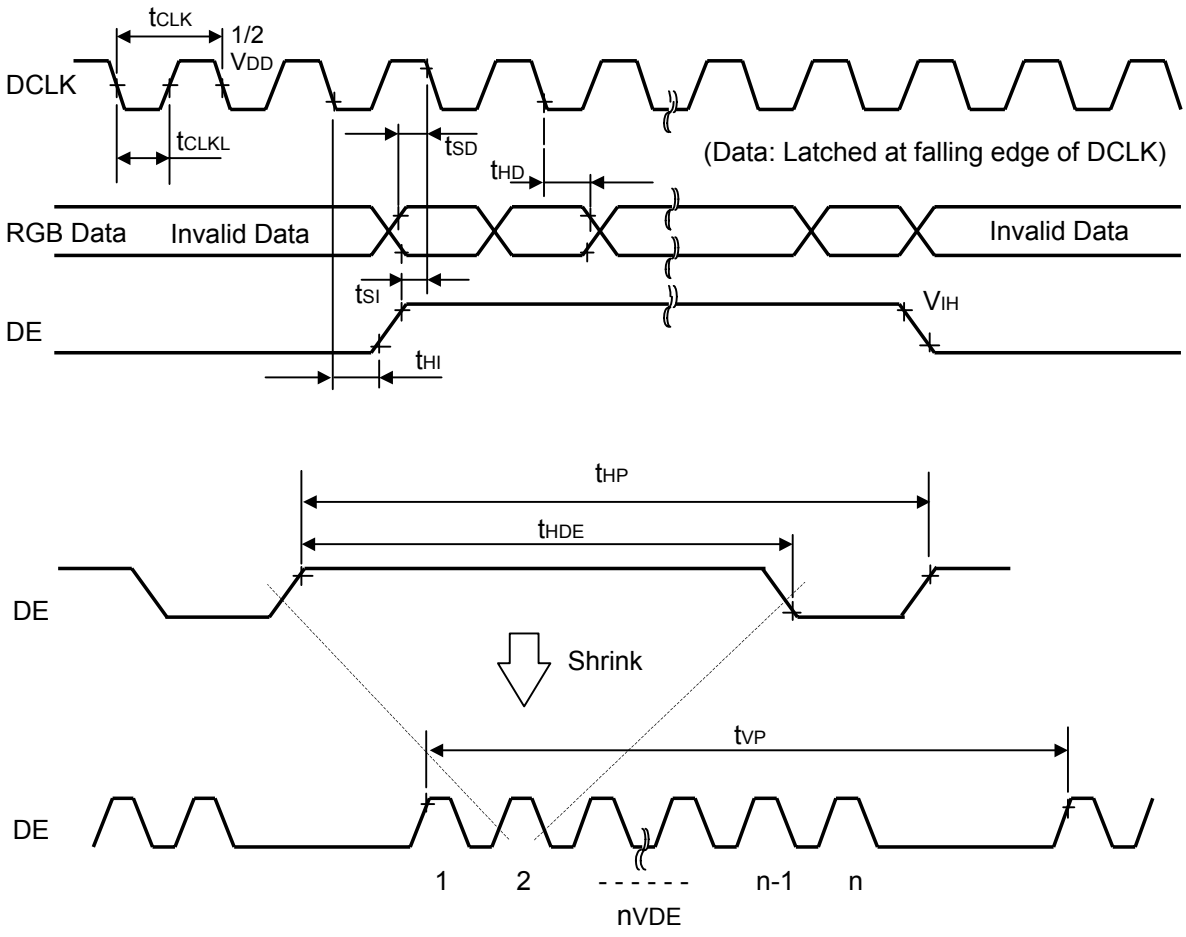
INTERFACE SIGNAL TIMING PARAMETERS (DE_MODE)

PARAMETER		SYMBOL	MIN	TYP	MAX	UNIT	NOTE
DCLK	Frequency	f_{CLK}	58	64	70	MHz	$t_{CLKL}=1/f_{CLK}$
	Duty	D	(0.40)	(0.50)	(0.60)	-	$D=t_{CLKL}/t_{CLK}$
DE	Setup Time	t_{SI}	(3)	-	-	ns	for DCLK
	Hold Time	t_{HI}	(1.5)	-	-	ns	
	Horiz. Period	t_{HP}	TBD	TBD	TBD	t_{CLK}	
	Horiz. DE	t_{HDE}	1280	1280	1280	t_{CLK}	
	Vert. Period	t_{VP}	TBD	TBD	TBD	t_{HP}	fv=60Hz Typ.
	Vert. DE	n_{VDE}	720	720	720	n	
DATA	Setup Time	t_{SD}	(3)	-	-	ns	for DCLK
	Hold Time	t_{HD}	(1.5)	-	-	ns	

[Note 1] f_H (Horizontal Frequency) = $1/t_{HP}$
f_V (Vertical Frequency) = $1/t_{VP}$

[Note 2] These signal timing parameters are specified at the digital inputs of LVDS transmitter.

INTERFACE SIGNAL TIMING DIAGRAM (DE_MODE)

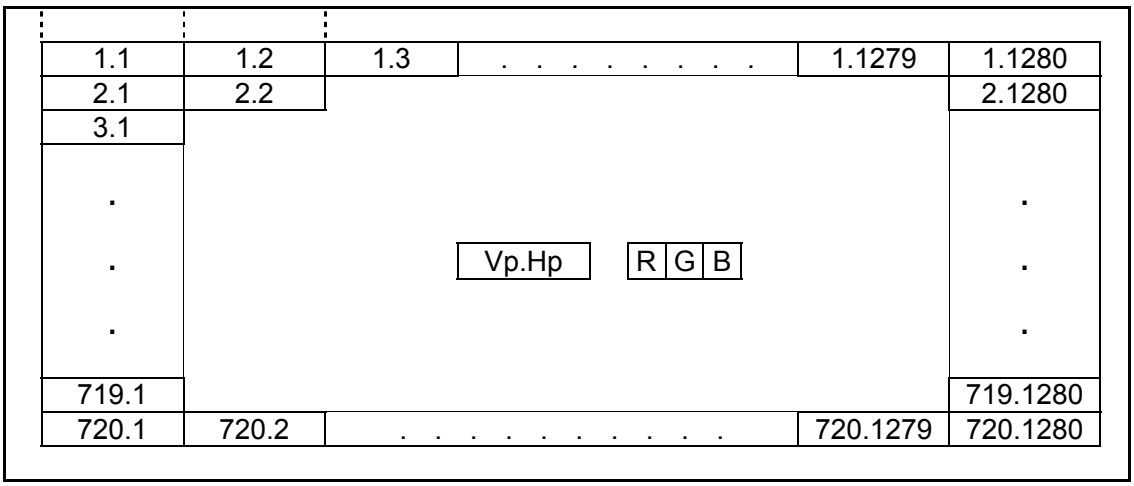


RELATIONSHIP BETWEEN INPUT DATA AND DISPLAY COLOR

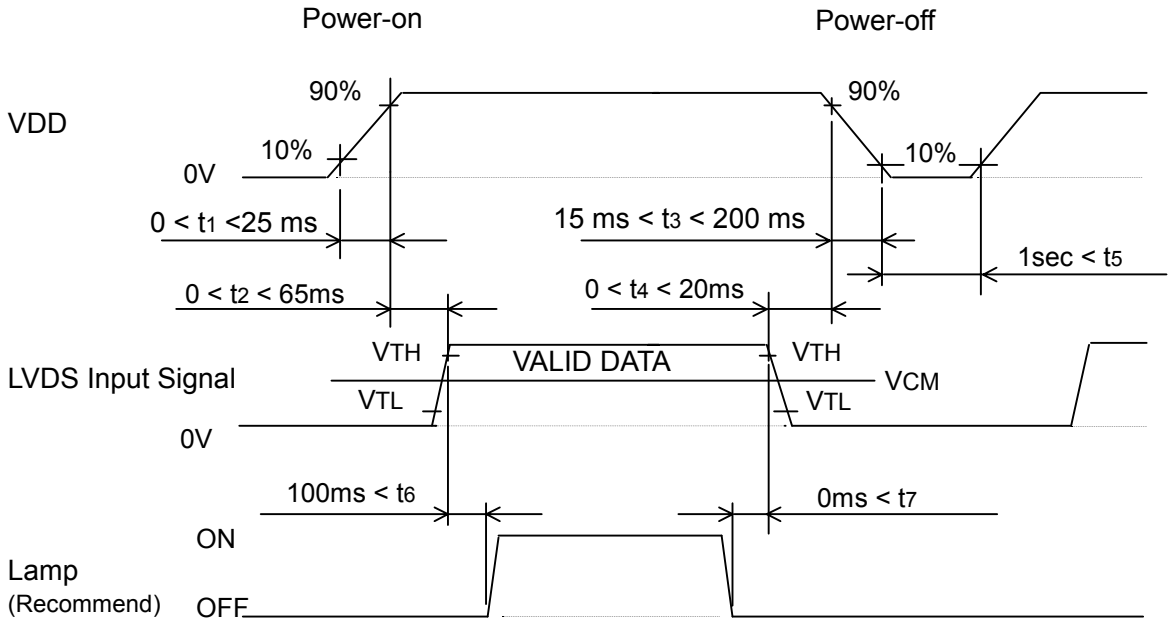
	INPUT DATA / DISPLAY COLOR	RED DATA								GREEN DATA								BLUE DATA							
		MSB							LSB	MSB							LSB	MSB							LSB
		R7	R6	R5	R4	R3	R2	R1	O0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
BASIC COLOR	BLACK	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	RED(255)	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	GREEN(255)	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L
	BLUE(255)	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H
	CYAN	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
	MAGENTA	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H
	YELLOW	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L
	WHITE	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
RED	BLACK	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	RED(1)	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	RED(2)	L	L	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	:					:								:								:			
	RED(253)	H	H	H	H	H	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	RED(254)	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	RED(255)	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
GREEN	BLACK	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	GREEN(1)	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	L
	GREEN(2)	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	L	L
	:					:								:								:			
	GREEN(253)	L	L	L	L	L	L	L	L	H	H	H	H	H	H	L	H	L	L	L	L	L	L	L	L
	GREEN(254)	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L
	GREEN(255)	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L
BLUE	BLACK	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	BLUE(1)	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H
	BLUE(2)	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L
	:					:								:								:			
	BLUE(253)	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	L	H
	BLUE(254)	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	L
	BLUE(255)	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H

[Note 1] Color(n): 'n' indicates gray scale step.

RELATIONSHIP BETWEEN INPUT DATA AND DISPLAY POSITION



POWER ON/OFF SEQUENCE REQUIREMENT



When the power is off, I/F Input Signal must be kept at either low level or high impedance.

Power sequence for Lamp (backlight) is not specified especially, however it is recommended to consider some timing difference between I/F Input Signal as shown above.

If backlight lights on before LCD starts function, or if backlight is kept on after LCD stopped function, screen may look white for a moment or abnormal image may be displayed.

This is caused by variation in output signal from timing generator at I/F Input Signal on or off. It does not cause damage to liquid crystal molecule and driving circuit.

PRECAUTIONS (INSTRUCTIONS FOR SAFE AND PROPER USE)

1. Instructions for safety

(1) Please do not disassemble or modify LCD module to avoid the possibility of electric shock, damage of electronic components, scratch at display surface and invasion of foreign particles. In addition, such activity may result in fire accident due to burning of electronic component.
LCD module disassembled or modified by customer is out of warranty.

(2) Please be careful in handling of LCD module with broken glass.
When the display glass breaks, please pay attention not to injure your fingers. The display surface has the plastic film attached, which prevents dispersion of glass pieces, however touching broken edge will injure your fingers. Also Lamp (Cold Cathode Fluorescent Lamp) is made of glass, therefore please pay attention in the same way.

(3) Please do not touch the fluid flown out of broken display glass.
If the fluid should stick to hand or clothes, wipe off with soap or alcohol immediately and then wash it with water. If the fluid should get in eyes, wash eyes immediately with pure water for more than 15 minutes and then consult the doctor.

(4) Lamp contains mercury inside. Please follow regulations or rules established by local autonomy at its disposal.

(5) Please be careful to electric shock.
Before handling LCD module, please switch off the power supply.
Since high voltage is applied to Lamp terminal, cable, connector and inverter circuit in operation mode, touching them will cause electric shock.

2. Instructions for designing

(1) Mounting of LCD
Please fix LCD module at all mounting holes and flanges shown in this specification for installation onto system. The used screws should have proper dimensions.
Furthermore, designing of mounting parts should be adequate so that LCD module is not warped or twisted, to achieve good display quality.

(2) Heat radiation
Lamp generates heat at lighting and causes temperature rise inside system. Therefore, designing to radiate heat like radiation slits at cabinet is recommended to meet the specified operating temperature range for LCD module.

(3) Noise on power line
Spike noise contained in power line causes abnormal operation of driving circuit and abnormal display. To avoid it, spike noise should be suppressed below VDD $\pm$100mVp-p. (In any case, absolute maximum rating should be kept.)

(4) Power sequence
Before LCD module is switched on, please make sure that power supply and input signals of system, testing equipment, etc. meet the recommended power sequence.

(5) Absolute maximum rating
Absolute maximum rating specified in this specification has to be kept in any case. It shows the maximum that cannot be exceeded.
Exceeding it may cause burning or non-recoverable break of electronic components in circuit. Please make system design so that absolute maximum rating is not exceeded even if ambient temperature, input signal and components are varied.

(6) Protection for power supply
Please study to adapt protection for power supply against trouble of LCD module, depending on usage condition of system. Fuse installed on LCD module should be never modified. Any modification to make the function of fuse ineffective may cause burning or break of printed wiring board or other components at circuit trouble.

(7) Protection against electric shock
High voltage is applied to Lamp connector, inverter circuit and Lamp at lighting. Please make design not to expose or be accessible to such high voltage parts to avoid electric shock.

(8) Protection cover and cut-off filter for ultraviolet rays
When LCD module is used under severe condition like outdoor, it is recommended to use transparent protection cover over display surface to avoid scratches and invasion of dust and water. In addition, when LCD module is exposed to direct sun light for long time, use of cut-off filter for ultraviolet rays is also recommended. Please be careful not to get condensation.

3. Instructions for use and handling

(1) Protection against Static electricity
C-MOS LSI and semiconductors are easily damaged by static discharge. LCD module should be handled on conductive mat by person grounded with wrist strap etc. to avoid getting static electricity. Please be careful not to generate static electricity during operation.

(2) Protection against dust and stain
LCD module should be handled in circumstance as clean as possible.
It is recommended to wear fingerstalls or ductless and soft gloves before handling to avoid getting dust or stain on display surface.

(3) Protection film for display surface
It is recommended to remove protection film at nearly final process of assembling to avoid getting scratch or dust. To remove film, please pick up its edge with dull-head tweezers or cellophane tape at first and then remove film gradually taking more than 3 seconds. If film is removed quickly, static electricity may be generated and may damage semiconductors or electronic components.

(4) Contamination of display surface
When display surface of LCD module is contaminated, please wipe the surface softly with cotton swab or clean cloth. If it is not enough, please take it away with cellophane tape or wipe the surface with cotton swab or clean cloth containing benzine. In this case, please be careful so that benzine does not get in inside of LCD module, because it may be damaged.

(5) Water drop on LCD surface
Please do not leave LCD module with water drop. When the display surface gets water drop, please wipe it off with cotton swab or soft cloth immediately, otherwise display surface will be deteriorated.
If water gets in inside of LCD module, circuit may be damaged.

(6) Please make sure that LCD module is not warped or twisted at installation into system. Even temporary warp or twist may be the cause for failure.

(7) Mechanical stress
Please be careful not to apply strong mechanical stress like drop or shock to LCD module. Such stress may cause break of display glass and Lamp or may be the cause for failure.

(8) Pressure to display surface
Please be careful not to apply strong pressure to display surface. Such pressure may cause scratches at surface or may be the cause of failure.

(9) Protection against scratch
Please be careful not to hit, press or rub the display surface with hard material like tools. In addition, please do not put heavy or hard material on display surface, and do not stack LCD modules. Polarizer at front surface can be easily scratched.

(10) Plugging in of connector
Please be careful not to apply strong stress to connector part of LCD module at plugging in or out, because strong stress may damage the inside connection. At plugging in connector, place LCD module on the flat surface and hold the backside of connector on LCD module. Please make sure that connector is plugged in correctly. Insecure connection may be the cause for failure during operation.
In addition, please be careful not to put the connecting cable between cabinet of system and LCD module at installing LCD module into system.

(11) Handling of Lamp cable and FPC (Flexible Printed Circuit)
Please be careful not to pull or scratch Lamp cable, because Lamp or soldered part of cable may be damaged consequently.
Also FPC should not be pulled or scratched.

(12) Switching off before plugging in connector
Please make sure that power is switched off before plugging in connector.
If power is on at plugging in or out, circuit of LCD module may be damaged.
When LCD is switched on for test or inspection, please make sure that power supply and input signals of driving system meet the specified power sequence.

(13) Temperature dependence of LCD display
Response speed (optical response) of LCD display is dependent on temperature. Under low temperature, response speed is slower.
Also brightness and chromaticity change slightly depending on temperature.

(14) Slow light-up of Lamp under low temperature
Under low temperature, start-up of Lamp gets difficult. (The time from switch-on to stable lighting becomes longer.)
As characteristic of Lamp, operation under low temperature makes the life time shorter. To avoid this, it is recommended to operate under normal temperature.

(15) Condensation
LCD module may get condensation on its display surface and inside in the circumstance where temperature changes much in short time.
Condensation can cause deterioration or failure. Therefore, please be careful not to get condensation.

(16) Remaining of image
Displaying the same pattern for long time may cause remaining of image even after changing the pattern. This is not failure but will disappear with time.

4. Instructions for storage and transportation

(1) Storage

Please store LCD module in the dark place of room temperature and low humidity in original packing condition, to avoid condensation that may cause failure.
Since sudden temperature change may cause condensation, please store in circumstance of stable temperature.

(2) Stacking number

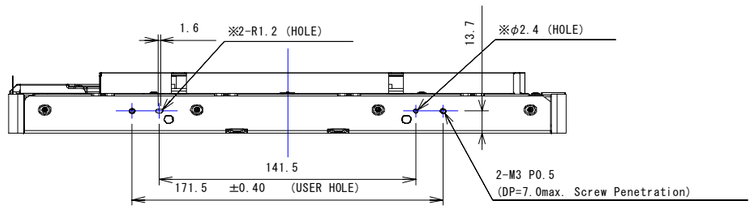
Since excessive weight causes deformation and damage of carton box, please stack only up to the number stated on carton box for storage and transportation.

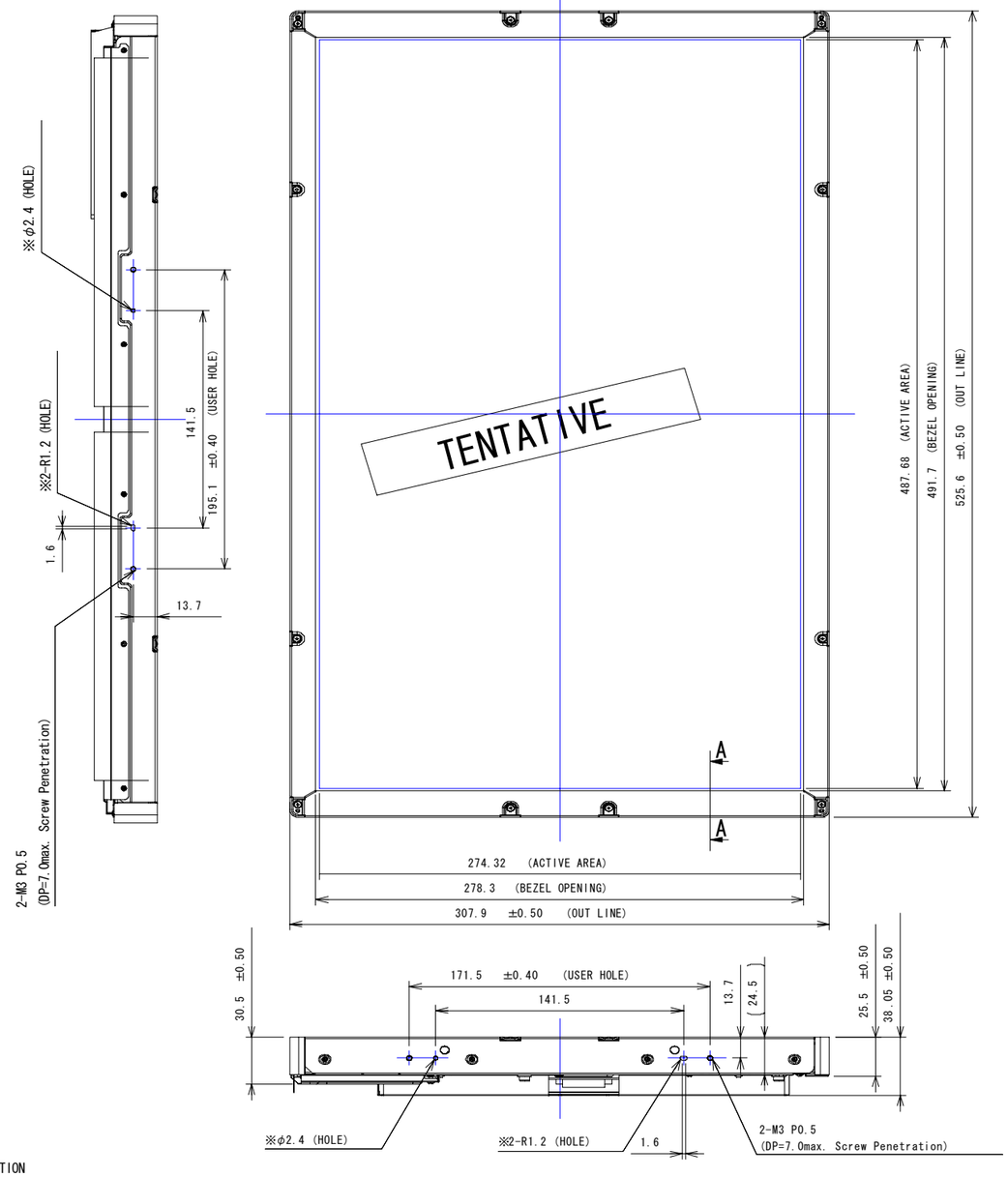
(3) Handling

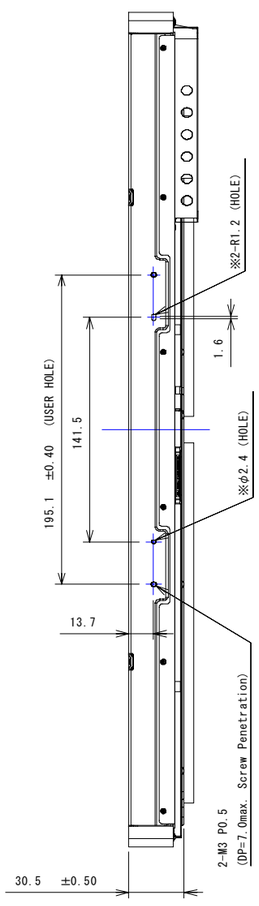
Since LCD module consists of glass and precise electronic components, it will be damaged by excessive shock and drop. Therefore, please handle the carton box carefully to minimize shock at loading, reloading and transportation.

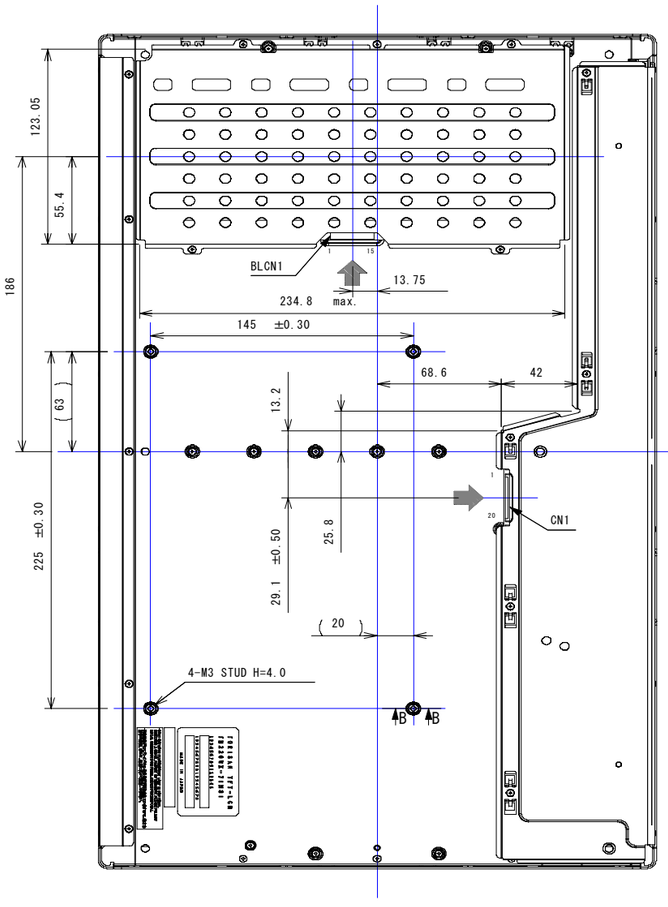
Outer Dimensions

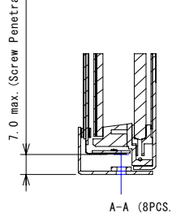
Nov.8.2002



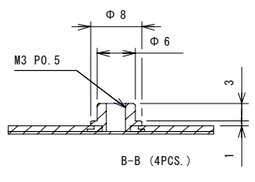








A-A (8PCS.)
USER HOLE SECTION



B-B (4PCS.)

◇NOTES
1. BACKLIGHT:8 COLD CATHODE FLUORESCENT LAMPS.
2. I/F CONNECTOR SPECIFICATION.
   -MAKER : HIROSE
   -PART NO. : DF14A-20P-1.25H
3. LAMP CONNECTOR/WIRE SPECIFICATION.
   -MAKER : JST
   -PART NO. :
   -HOT : BHR-04VS-1
   -COLD : BHSR-02VS-1
4. UNSPCIFIED TORLERANCE TO BE ±0.5.
5. LAMP WIRE SPEC.
   -HOT : UL3239AWG24 AC3KV φ1.6
   -COLD : UL3443LFAWG26 AC3KV φ1.04
6. USER HOLE : DP=7.0mm max. SCREW PENETRATION.

CAUTION
MARK(※):USE THESE HOLES BY DEPTH OF MAXIMUM 1.0mm.